PNC Bank Ft. Lauderdale Net Zero Bank Branch (5/23/13)

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Presenters/Q and A:
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Conclusion/Thank you:
Michael Baechler and Rosemarie Bartlett, PNNL

Intro: *Walter Scheib*

Scheib: Alright we're going to get started. Hello and welcome to today's Commercial Building Partnership's webinar. My name is Walter Scheib, I work for Energetics, Inc and I've been working with PNC Bank, PNNL, and DOE to coordinate this webinar. The webinar will focus on PNC's Net Zero Bank Branch located in Ft. Lauderdale, FL. And will share details on energy efficiency improvements and lessons learned during this case study with the hope that those attending today's webinar will benefit from the lessons learned, thus broadening the impact of the Commercial Building Partnership. Because this webinar is being recorded, we will be answering all questions at the end of the presentation. The actual presentation will take 30 minutes and then the remaining 30 minutes will be used for Q&A. At any time during the presentation please type any questions you have into the chat window on the GoTo Webinar dashboard, and these questions will be answered after the presentation. So without further ado, I will now turn things over to our presenter Larry Miltenberger, who is the senior project manager for PNC Bank Design and Construction Services. Larry will give brief introductions for himself and all presenters who are on the line, and then being the presentation. Larry?

Presenters/Q&A: *Lawrence (Larry) Miltenberger; Benjamin (Ben) Gensler; Michael Baechler; Rahul Athalye; Rosemarie Bartlett*

Larry Miltenberger:

Good afternoon, again I'm Larry Miltenberger and I am the senior project manager in the Design and Construction Services group of PNC Bank. Joining me today is Ben Callam of Gensler; Ben is the project architect for the PNC Bank branch built t the corner of Dayview Blvd and Ft.? Avenue in Ft. Lauderdale, FL. This building project was the result of PNC's participation in the DOE's Commercial Building partnership. As most of you may know, the program consist of two parts. One was to design a new construction building which uses 50% less energy than required by ASHRAE 2004; part 2 was to remodel an existing building to reduce energy use by 30% over ASHRAE 2004. In this partnership, PNC provided the services of our design consultants and in-house staff, while the DOE provided in kind services of the PNNL. PNNL's expertise is in computer modeling for various building components. In this presentation we will focus on the first part of the program and describe the process of discovering and overcoming the challenges of building a highly efficient commercial building. Ben will give us a little bit more on the design efforts shortly, but first, what was the effort all about? Before I get started, a little background on PNC Bank. We are a large regional bank headquartered in Pittsburgh, PA with facilities in most continental Unlisted States, Europe, and Asia. PNC Bank has an in-house realty service department which manages all corporate relay functions including construction management. In 2004 we started a new construction program with Gensler leading the design team consisted of Gensler, CJL Engineering, there are MEP engineers, GMS structural engineers, Terra Tectonics landscape design, and Paladino as our lead consultant. This 3700 sq ft signature branch design incorporated energy efficient measures, EEMs, with the goal of LEED certification for each branch. Within a year or so of starting this rollout program, the construction methods were standardized and we're building the same building over and over. Paladino proposed to the USGBC a volume certification program using PNC Bank's branch program as a template. After a trail period, the USGBC implemented their volume certification program and PNC took full advantage so that by 2009, PNC had built more LEED-certified buildings than any company in the world. This standard branch design and construction process gave us a pretty good feel for the DOE challenge. Gary Saulson, Executive Director and VP for realty services, accepted the DOE challenge and added to it the opportunity of designing and building a net zero energy building. Now I'm going to turn it over to Ben.

Ben Callam

Thanks Larry. So let's start out with a couple quick definitions. The first is net-zero; there are a lot of different definitions for net-zero. In our case, we're using a definition that is derived directly from the U.S. Department of Energy Commercial Buildings Initiative. The first part of that is we look at what the energy profile of the existing prototype building. Through various energy efficiency measures we reduced that by 50% and that's compared to the ASHRAE 90.1 2004 baseline. To hit net-zero, we had to make up the remaining 50% of that energy with onsite renewables, purchased credits, things like that are not part of this equation. Everything is generated onsite. We calculated on annual energy consumption basis, we're not using batteries or anything. This is a net meter so that we need energy we produce over what we use in the branch gets pushed out into the grid in Florida and then parts of the year when we're using a lot of energy in the branch, we'll actually be drawing some from the grid.

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So, first thing that we kind of get underneath us is why is retail an important opportunity when it comes to net-zero or high efficiency building? We rollout architecture, for those that aren't familiar with the term, it has to do with, Larry described it as a prototype design which is then sort of implemented across the various regions within the U.S. Part of that is obviously cost efficiency; also time, you save some on time because you're doing a building that is very similar to the one that you had previously built, you're able to troubleshoot things faster and keep track of elements that may not be as advantageous to have in your design and sort of tweak as you go. But related to energy, what this means is that you're able to design- if you implement these energy efficiency components on your prototype- immediately you're going to be rolling that out to your entire portfolio. So if you have 10 branches coming up in the queue, all of those will be almost as efficient as the prototype design, as we're going to discuss here.

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So the first part of this we're going to talk about as related to the prototype which you see in the background here- this is the northeast prototype.

A little bit about this prototype- it's about 4000 sq ft., varies a little bit, there are 6 tellers, 6 customer rooms, the drive thru is attached typically [inaudible] construction. And the design for the northeast [inaudible] I already mentioned out PNC group is grown out of Pennsylvania and at the time we started to work in Florida, PNC's footprint was basically near to the Washington, DC area and they've since expanded closer [inaudible].

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[inaudible] we talk about some of the energy profile information we got from the [inaudible] metering.

Larry Miltenberger:

Thanks, Ben. In the summer of 2009, Jim Kroner, one of our PNC engineers here, kicked off meetings with PNNL and provided them with a set of the typical PNC signature branch construction drawings, and PPNL was able to determine the ASHRAE 2004 baseline for our building. We also established that in order to meet the standard, we would need to annually consume 140,117 kW hours per year. The next step was to verify the actual energy consumption of the typical branch. We chose a recently completed branch in Richland, PA to install panel and plug loggers. The metering was done from November 2009 to February 2010. These pie charts show the distribution of our consumption in the four broad categories. You'll see that we have plug loads, which a pretty broad category, interior lighting, exterior lighting, and the RTU is the rooftop air conditioning system. We also, that rooftop unit had a gas fire component to the energy which we really didn't evaluate because as it turned out we finally decided on the site in Florida where you really don't use heating as much as you use your cooling, so that load didn't really come into play so much here.

Next I want to show the next slide, which will show some of the typical information we were able to gather up. This slide shows our lobby PVs, we have an internet station and they're all on the same circuit. What these charts are able to show us is the power usage over a time period. One of the benefits

of this is it allows us to create a schedule for turning off and on the power using programmable breakers and other power management tools. Ben.

Ben Callam:

So a little bit about our initial energy efficiency measures in the branch. We sort of attacked it by the categories here: interior and exterior lighting, plug loads, fans, cooling, and water. In our case, a big branch, hot water is really only for washing hands in the bathroom so it's a pretty small...of this./ The first thing I want to talk about is the envelope construction and it wasn't like we went out and designed the most expensive, highest efficiency envelope we could. We really took total lifecycle cost information into account here. And there are a number of other things that are a part of this chart; you can see where our baseline ASHRAE component was here. We have the target, which was somewhere in the middle. And then these are plots of all the different components as we're evaluating the different options for the net site energy percentage savings. You can see sort of the inflection point at the corner here and we're talking about our total lifecycle cost is decreasing and we're still saving energy and then it starts to spike here in the end. So what we did, we looked at the cases around this inflection point and settled on a typical CMU block, two inches rigid insulation and brick near wall construction. It's something you would find most places in the U.S., a very typical wall construction. And the point of this is just to say there was a very, cost efficiency was a very big component of this evaluation and we were still able to achieve our goals.

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Next we'll talk about natural lighting. The bank and the orientation of the shading was evaluated along with different glazing options to get us the best light to solar gain ratio within the branch. The way we did that was mostly indirect lighting and all of the primary public spaces within the branch have excellent natural light throughout most of the day.

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As far as artificial light, we went after the highest efficiency components we could find in the market, which were LED fixtures. Naomi Campbell from the PNNL helped us find the fixtures that had the best coloring index; it's really high quality light. It's all coming from cutting edge LED fixtures.

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So one of the lessons we were able to take away from the metering data and apply across our footprint was the reduction in the size of our rooftop HVAC units. The metering graph showed during the heat of the day large spikes which indicated power surge at the startup of the second stage compressor. Then the power use lowered off until the set temperature was met and then it dropped off back to the first stage compressor. The time duration was relatively short for these spikes which meant that our 15 ton units were not running efficiently because of the second stage compressor was essentially short-cycling. We found that by reducing the RTU size from 15 to 10 size, we would save money not only on first cost but also on operating cost. This information resulted in immediate design change across our roll-out

program as well as our replacement program. Typically engineers design these units to have a larger capacity and it turns out that the efficiency counterbalanced against that so we went with the smaller unit and have been doing so since this information became available.

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Now we also looked at several different strategies to come up with the best combination of technical efficiencies that are available out in the HVAC market and we ended up settling on a design using an adaptive fan in the RTU coupled with an ERV. Now the ERV allows us to capture the cool energy from the exhaust air and transfer it to the incoming fresh air, thus reducing the amount of energy necessary to cool the fresh air to the set temperature. So we took all these EEMs and we plugged them back in the model after we had the metering information and we adjusted that model to see where we were and how we stacked up against our goal.

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As you can see from this slide, we were at about 25.8% of that reduction and we had a lot more work to do, and we were able to determine we had plug loads and exterior lighting which presented the biggest opportunities. So the largest consumption in the branch was In the plug loads, which accounts for everything from the teller computers to the ATM machines, copiers, and even the desktop adding machines. This is no small task as there were multiple internal PNC partners who specified all this different equipment. We looked at what we could control from the PNC side of things. Our client delivery service folks, they manage our computer equipment and they deploy that equipment across the entire footprint. I engaged these folks with the metering data to show them how graphically the energy was being used and when. Since PNC is a large corporate IT customer, these folks get sent new prototype computers and monitors for testing in our lab, so since they already had this lab set up they were able to take some of the newer, high efficiency computers and monitors being given to us by different manufacturers and add to their evaluation the energy component because if you look at a typical monitor it will have some type of energy information but it doesn't really tell you anything about how that computer or monitor is being used in an operating environment such as a branch bank. We also have a lot of components that you can't sacrifice if you're running a retail operation which includes our marketing and a lot of our other elements such as signage. So you have to take all of these things into account and use the most efficient equipment that you can come up with. One of the things that our partner PNNL was able to do for us was provide plug loggers than allowed our IT folks to not only monitor the energy consumption of the computers but also the other equipment such as the copiers, we have cash counting machines, all kind of different things, and they were able to determine the most efficient model and recommend that for this project. Along with equipment recommendations, they were also able to come up with a software solution that allowed a master and slave type of setup in the branch, where all of the computers after hours would go to sleep except one, that one computer would wake the other guys up at the time in the middle of the night when they typically receive their daily software updates, then they shut the computers back off and still the branch was ready to open in the morning. When it came to the plug loads we had to look at a lot of different strategies and one of those also included aux sensors on plug strips and relatively low tech type of things. For our signs, we'd

already started to migrate to the LEDs. Now the branch we had metered was still using the neon type of configuration but we were able to measure the LED efficiencies over the neon and all of the signage was changed to LEDs, but we did have a challenge on our monument sign because that monument sign needs to be lit up and seen from a fair distance. We were using a high output fluorescent tube and the LEDs were very difficult to, you have to remember this was a couple of years back, the LED technology was emerging and they didn't have a replacement for these high output fluorescent tubes, but as we were doing our evaluation and testing, Naomi Miller found an opportunity with one of the manufacturers and we recommended that. There's really no difference between the high output fluorescent and the LED tube which is in place today.

Next slide Ben.

Basically what we ended up doing was taking all these strategies that we'd come up with and all this evaluation and plugged it back into the model and ran it one more time. We were able to determine that sure enough, with all these different strategies, you can see we whacked the plug loads and the exterior lighting pretty significantly and we were able to, at least in the model, determine we would be able to make our 50% reduction. And so this is where the fun started for Ben and his team, so I'll let him go into that.

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Ben Callam:

So what we call part 3 here Reality Strikes, taking our beautiful model and applying it in the real world of permitting and construction; it wasn't without a few hiccups but the story in the end is good.

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The first thing when we started looking at the site [inaudible] we had to on the site was an up and coming master plan for that area in Ft. Lauderdale. We may have been able to actually bully our way through this and push our existing plan through when we first started this process, but part of the mission here for PNC and for these branches everywhere was to design something that fits into the community well. As you can see, this is sort of a sketch from their master plan communication. This is our site right here where it says gateway. There were a few other constraints that they had asked for us to adhere to in terms of our site planning.

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So this was kind of the first sketch site plan we had. You can see there's an attached drive-thru the bank, it's sort of situated in the middle; this was basically done from the traffic engineering standpoint. As we moved forward with the design we worked quite closely with the city. This is a summary of 4 iterations but there was more like 15 or 16 overall site plans that we've done. So you can see we moved the entrance to the corner to be more pedestrian friendly, then we moved the building to the corner so they

would have more street footage and at that point the drive thru had to detach from this area and move to the back to include a stack- the amount of curb stacking required by the City of Ft. Lauderdale. And because the drive thru and more of the parking was out to the side of the site now, we added a second entrance on the back side of the buildings, so there's one on the corner here in the front and one on the back. As a result, we had to reconfigure parts of the inside of the building and the branch itself is about a 100 sq. ft. larger.

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So then we were faced with the challenge of looking at photovoltaic production. At the time we were looking at the technology that was available on the market; it looked like we were going to have to fit about 4,900 sq. ft. of voltaics on a building of about the same footprint. So instead of- there are two approaches- plaster every single surface with PVs, but that wasn't quite the- that would start to impact the PNC brand architecture. The other possibility would be to move the PVs kind of off in the corner side as a solar farm. After discussing, the PNC design team decided the integrated approach would be preferable, but because it would give us better southern exposure for a lot of these PVs but also because it would start to engage the customers, the people driving by and the people parking their cars and we could actually use a lot of these PVs as canopy, part of the architecture integration. Along with that, related to the master plan and some of the architectural, brand architecture of PNC, we looked at how we can sort of tie all these elements together with a single architectural expression and craftsmanship. Again the master plan was looking for a design that would maximize street frontage so that came into play and we came up with a design where we have sort of a [inaudible] screen that wraps up underneath the canopy and that becomes shading on the upper windows for the main atrium space and provides [inaudible] lighting.

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So going beyond 50%, this was sort of after we made the design changes and we're going back and reevaluating where we're at and the story in the end I think is a good one.

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Larry Miltenberger:

Okay so one of the opportunities that we were presented with was a system called a DC grid, and what this consists of is a DC power grid that is essentially your lay-in ceiling grid, and allows you to clip into your grid and move your lights around and do all kind of different things with it. PNC bank was approached by Armstrong industries several years ago. They were testing this out and they wanted a corporate environment to try it out in, so we said sure come on over and install it in our conference room and so they had to go through and retrofit existing fixtures because at that point there weren't any DC fixtures available. So we were a guinea pig for this effort and you know it had just kind of fallen by the wayside because for a long period of time we hadn't heard anything about it. We got into this process of designing this high efficiency branch and somebody sat the Emerge Alliance had gotten wind of it and contacted us and said they remember us folks, well we've got some improvements and we'd

like to be part of your project, and we said sure. So we started talking with them and it turns out we were able to tie the DC grid directly to the PVs. Now the energy efficiency is gained here by not converting power from AC to DC and back and forth, and so this was done after we had done our 50% modeling. We were constantly being approached with all these opportunities to increase the efficiency of our setup, and so we enthusiastically grabbed a hold of this DC design and installed it in the building. We were limited to using it in the office spaces for now, but as we evaluate and continue to learn about it, we might expand this further.

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Now as I said, it took a while for this design and modeling process to take place, and the whole time all the manufacturers of lighting and computers and copiers and all kind of things, they're all going on about their business designing the next energy efficient model, and so we were constantly encouraged by the opportunities that presented themselves out of the blue more or less to increase efficiencies. So we incorporated everything we could to put into this branch, and I'll use the example of the DC grid lighting. At the time, the DC grid folks were just on the cusp of getting ready to roll this out commercially and they were still testing the light fixtures, and we basically said hey folks we'll take them. We've tested them enough, we know what they'll do, and so we were getting stuff fresh out of the lab, first production run kind of thing, to plug into this building because of the efficiency measure we were looking for.

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Ben Callam:

So we spoke earlier about how the building itself got bigger and how there was some new equipment that had entered, but related to the efficiencies that came from the equipment and just as we were reevaluating about a year later, maybe a little more than that, the technology is improving so quickly that we started seeing even more drops in our efficiency. You know we, prior, a year before this was designed, there were only high efficiency LDTVs on the line and then when we came back around to it we could use LED TVs for the equipment. So overall, we saw an increased reduction in our percentages compared to the baseline, so we are looking more at 56% overall reduction, which is fantastic. If you look at this chart here in the upper right, this is the original baseline. This is the smaller building which had the almost 51% reduction here, which brought us to around 69,000 kWh per year. Even though we added 1,000 ft to that building, we're only increasing the overall consumption by a little bit. We felt pretty good about that and we were a lot more comfortable with a 56% reduction than a 50.7%.

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So beyond energy, the project here, the sort of initial mandate was related to energy efficiency going after this net-zero piece, but if we're going to do sort of a showcase project then we're going to pull out all of the stops on energy; we want to extend that to the rest of the site as well.

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The first thing we did was look at our site plan and our landscape design and at the ways of improving, or reducing the amount of water that the branch would need for irrigation and also to make some improvements for storm water management. As you can see, there's only really one catch basin in the entire site plan at the end of the paving. The rest of the water goes off into these flumes into the landscape here along the entire perimeter of the site. These areas are all planted with native plants, which means they require less maintenance, they require less water for irrigation, and additionally they helped to clean the water that filters through them as it goes back to the storm water system. We found it was fortunate too because you see there's the Tarpon River to the north of the site, and actually all of this storm water collects and shoots out into the river, so we thought that, given our proximity to the river, it was important that we take that step. The other thing we did was install permute paving in these blue areas here on the parking, which is another measure that slows the storm water down as it's moving back to the main storm water system, so there's not a sudden spike when there's a large rain event. So all of our planting is native, it requires very little irrigation and that's our water treatment strategy,

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Larry Miltenberger:

Okay, so in order to measure our ongoing energy use, we installed a metering system which incorporated a lobby touch screen for community education. This system allows us to see energy use on a circuit by circuit basis. It also allows us to compare use over various time periods and it's been instrumental in validating the energy model in the real world. We will be doing this for quite some time because our first information come through and we really had to kind of sort through what it all meant and we're in the process of fine-tuning our building so hopefully here after we have enough data together we'll be able to present a case study that shows how the modeling and the real world mat up, so stay tuned for that one.

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Ben Callam:

So to conclude here, our sort of number one lesson, and Larry and I are putting our heads together for this, a lot of the focus for this project is on, specifically, the engineering piece, which is obviously a hugely important aspect, but without creative adaptation and human engagement such as what Larry was talking about with the all of the vendors and the various groups at PNC [inaudible] IT equipment and the computers and the marketing, all of those pieces; those human elements really become just as important as the engineering measures to hit this 50% reduction and really have a successful, sustainable design.

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I'll turn it over to Larry to wrap up here with a little bit more about where we are today and some of the challenges and opportunities that are coming up.

Larry Miltenberger:

Okay so we've really only gotten one month's worth of good data from the power company. We are running a higher use than what the model would've predicted, and because we have this metering system in place, we were able to determine that our HVAC system was not operating according to its programmed schedule. We've had the technicians out there to take a look at what's going on and see why this thing keeps jumping track, but we were also able to determine that we had other units within our footprint that were doing the same thing, so we're not sure what's going on and we've engaged the vendor to analyze what's going on with the programming piece and why it keeps jumping up, and if you were able to take out the RTU and compare our other uses, we're falling in line; the RTU is the big bugaboo right now and soon as we can get that all dialed-in, again this case study, we'll follow up after we have significant data, that will come around here and hopefully we're able to validate our model and even improve on it. So that's where we stand today, it's a work in progress. We're very proud of the building that Gensler designed, along with the all the other team members, and we could not have done this effort without the engagement of the PNNL folks. They were instrumental in opening our eyes to all the minutiae around the energy consumption and how seemingly small design decisions affected overall power consumption. It's been a real eye-opener; we've started to implement various parts of our research and learning across our roll-out program and we look forward to more opportunities as they become cost effective to continue with that. So with the being said, I'd like to thank everyone and I'm going to turn it back over to Walter for the Q&A.

Q&A

Q: If the 15 ton unit was so oversized, what method of load calculation was done on the previous prototypes?

Larry: Loan calculation? You mean load. Well unfortunately I am not an MET engineer and the information that came out of the modeling led the engineers to believe that reducing the size would actually increase the efficiency of the unit. Now, as far as the baseline load calculations and why that 15 ton, I'm afraid I'm going to have to go back and Walter if you forward me the email I might be able to get that information to our engineers and have them answer that in a more technical manner.

Q: Is PNC open to considering other sustainable products in other areas? I'm in the Virginia/MD/DC area and would like to make contact.

Larry: Absolutely, we are always looking for energy efficiency and sustainable products, materials, services to increase our corporate goal of being as green as possible, so my name and my contact information is on that last screen; just go ahead and shoot me an email, we'll set you up with the right folks.

Q: For the DC lighting system, did you have to include battery interface? Also, if you did install batteries, did you incorporate batteries into demand-response protocol?

Larry: No actually we didn't. The Emerge Alliance and in particular, a company called Nextech, provided us a box and it's a black box in my mind, again I'm not an engineer, but essentially it takes the power from the PVs during the day and powers up the DC grid. Now obviously as the seasons change, the time of the that it's light and dark changes, so we have an AC piece in there, it's tied into the power grid, and this box allows the power to switch back and forth between DC and AC almost seamlessly. You would never be able to see a flicker in the flight or any of that kind of stuff. As I said earlier, we were dealing with some pretty early technology, some pretty early prototypes of some of this technology, and for instance we had a manufacturer of an aux sensor, we had a manufacturer of a light, we had a DC grid, we had all the components of that DC grid and they all had to integrate together, so it took us a little bit of time to work with all the different manufacturers to make sure that everybody's part was communicating with each other with the same language as it were. It was kind of exciting to be on the front end and watch some of that stuff transpire.

Ben: There's one other thing that I would add to that. The question might be getting at an emergency lighting situation which, in our case with the DC grid, we did not tie the emergency fixtures to the DC grid. They're still the same battery pack fixtures as before but the good thing was, with the Emerge Alliance fixture, it was actually the same LED fixtures that we were looking at for all of the other branch prototypes that don't use the DC grid. So we were able to actually get a DC version of that fixture, and you wouldn't see any difference in that branch.

Q: Did you achieve the ENERGY STAR or LEED rating?

Larry: Were in the process of LEED certification, LEED platinum as it were. I don't have the scorecard in front of me, but I think we've only not been able to go for about 4 or 5 points out of the 80 possible, so we're definitely on track to hit platinum with this building. We'd like to go as far as we can. Paladino is our lead consultant, and they're in the process of getting the building evaluated by USGBC for that certification. As far as ENERGY STAR, there's another group of folks here at PNC who are working with that, and honestly I don't have enough data on their progress.

Q: Can you please provide details about the roof system, roof type, insulation, R-value, and number of layers of insulation surfacing, etc.?

Dan: I don't have the roof R-value off the top of my head, I don't know if any of the PNNL folks on the line remember that? It's a bit like GPS systems, so you have steel beams and then another deck and then you have your rigid insulation and [inaudible] numbering. That's for the lower roofs, for the high roofs it was a very similar construction except for on the top we have a [inaudible] metal roof. It really wasn't, again to go back to sort of the discussion about the envelope; the materials used for 99% of the building are really a pretty typical way to construct. We just took extra measures to make sure we were hitting all these marks and all of these different pieces were working together.

Q: Does the municipality of Ft. Lauderdale, or other counties were you've built similar buildings, offered you a tax incentive? Can you demonstrate there's a premium earned for green building?

Larry: Unfortunately there's no premium other than the premium that PNC puts on being a good community neighbor. We tried our best to fit in to the neighborhoods in which we are operating. We don't go for tip financing and stuff like that if that's what the question is or revolving around. We basically, this happened to be an owned site which is why we were willing to make the investment and such an effort. We didn't want to do it on a lease site that we were going to lose in 20 years or whatever. We primarily are, we spend our own money, design our own branches, and it gives us more control than if we were subjected to municipal, I mean obviously we're subjected to a lot of municipal stuff, but a lot of that tip stuff comes with a lot of strings.

Q: What were the cost impacts for this project? What was the incremental cost increase in dollars per sq. ft.?

Larry: Well I hate to admit that I don't have all that detailed out. We're in the process of establishing we were able to hit the PNNL and DOE goal; that's one effort. The secondary effort is to go back and peel apart the different construction numbers and analyze how much went to the structural steel that had to be added say for say the louvers on the side, which are providing us a tremendous benefit, because you've got not only natural daylight that comes through those louvers, but it knocks down the heat of the sun and it really takes a big load off the cooling system. So that is a structural element that has been added to the building we typically wouldn't put on a building, but when you get a steel number from your contractor, he doesn't break down all that detail, so we've got to go back through piece by piece and go ok we need to understand this and this, which does back to the steel guy; they try to sort that out. So that's an effort that's ongoing and we don't have that information, hopefully when we get all our metering stuff straightened out, we'll also have that and be able to share with the general population.

Rahul Athalye: For the question about the roof insulation, I'd just like to provide the information. It's R-25 continuous insulation for the big top roof and R-38 cavity insulation for the attic roof. Thanks.

Q: What is the kW rating on the PV system?

Larry: It's a 55 DC rating and a 45 AC rating; now that's 1,000 kWh. Anyone want to add anything more to that?

Ben: No, I think that's actually kW.

Larry: Kilowatts, I'm sorry. So it's a 45 AC kilowatt unit or system.

Ben: And we expect to generate in the ballpark of 75 to 85 kWh per year.

Larry: Yeah and one of the things we were able to determine is that that system is actually working pretty close to the design. Now obviously as we've got a relatively small period of time where we've been able to monitor the output of the PVs, one of the cool things we were able to determine is that we are actually using about 25% of that power on a daily basis. So we're kicking out power to the grid, but at this point because we've got some excessive use on the RTU, we're not totally net zero yet, and again

all that definition means is that this is over an annual period of time. Once we get this baby dialed in then we have to watch it for a year and then we'll know for sure whether we hit out marks.

Q: What percentage of energy consumption does the PV address?

Larry: Well currently it's picking up about 25% of our monthly period because we've only got one month of good data right now. Shortly we should have the second month coming in. But it's about 25% and once we reduce the RTU consumption I expect that number to jump up.

Q: What was the percentage savings directly contributed to the DC grid?

Larry: Well we're still working on that one as well because it turns out we've got three of these, I'm going to call them a converter box; they have another acronym which I'm not going to try to go into. But one of the three boxes needed to be sent back to the lab. They were evaluating what happened with that one, but we are able to see that when the sun is shining we're on PV and if it's a cloudy, rainy day, it will jump back over to the AC. We can see that on a real time basis, and because the whole system is not up and running properly we cannot evaluate it as a percentage of the light power being consumed.

Ben: I think the manufacturer number for that is somewhere between 5 and 15% savings for the particular fixtures that you're saving from having to go through the AC panel in the back, but as Larry said this is very new technology, so we're sort of testing those assumptions of the model.

Q: Did PNC apply for any tax deductions for the energy efficient buildings under EPACT section 179d?

Larry: Well unfortunately again, I'm in the construction world, I'm not in the accounting world. I know that there was all kinds of talk about the various incentives and tax strategies but there's another group that is handling that and I actually haven't chased that down. I can follow up to find out what we're going. If the questioner would send me an email, I'll try to get you an answer.

Q: Could you please reiterate the sources of cooling energy savings?

Larry: Well, the rooftop unit uses the adaptive fan technologies, okay. One of the things again the rooftop unit coupled with this energy recovery bit ventilator, that, at the time that we were chasing these different technologies, there wasn't a package unit that had all the controls worked out and everything like that, so we were kind of putting together all these technologies and I think part of the problem we're facing right now is that the control package was relatively new and we were trying to do some things and push our efficiencies. That piece of it is proven to be, I don't want to say unreliable, but certainly we've found some problems with it. And so we're evaluating what's going on and how do we go ahead and fix that. The best news is that, since we started working with this program, the technology of other manufacturers has come along and where they actually do have package units that have an ERV built into them. They have a control package that's comparable, and so you don't have this cobbling together of different elements to make it work. We actually have two different manufacturers we're evaluating for branches in Florida that are being built as we speak, but it will be later this year before those branches are up and running and we're able to check the numbers and see how the performance of those units stacks up against the one we have in this branch.

Q: What metering and building automation systems were installed?

Larry: I'll throw out a couple names here. We have an Eaton breaker, it's a load system and it has a programmable breakers and everyone of those breakers has a CT with it, to the information from the CTs, the circuit transducers, goes to an interface box which is then read by Lucid. Lucid is the company that does our monitoring. And that's the screen that's in the branch that, when you walk in, you can touch it and it will toggle through different aspects of the energy metering and you can see how the PVs stack up to the energy sue. You can look at the four broad categories of plug loads: lighting, interior, exterior, and HVAC load. And of course you can also compare it over different time periods.

Ben: I was just going to say that the timing for all those pieces was established by PNNL, so when the copier would basically be shut off, all those things are programmed to the assumptions based in our model. It's not per se a system that's sort of self-tuning or taking care of that, sort of doing it ourselves.

Rahul: And just to add to that, so the plug load reductions and cool all these different technologies and also the highly efficient LED lamps help reduce the cooling load, which was part of the answer to another question about the reduction of cooling loads. Thanks.

Q: Is the touch screen dashboard custom or standard?

Larry: Well it's a standard product from Lucid Technologies.

Q: Did you tabulate your observations in terms of category such as technology, cost, energy saving percentage, etc.?

Larry: We're still in the process of evaluating our numbers, I mean this branch opened at like the end of January and granted it's May already, but it takes a while to fine tune all these pieces and make sure that they're all working as they're supposed to because, like for instance the DC grid, two of the three units are working fine, the one is not, so any of the information I have would have to be extrapolated and we kind of want to get everything working as it's supposed to so that we have good, accurate numbers. And then it takes a period of time so that you're not getting an anomaly in the weather or something like that.

Conclusion

Walter: Okay great, thank you, and with that, those are all the questions we had, which works out perfectly because we're almost out of time. So I'll just hand it over now to Rose Bartlett from PNNL who is going to say a few words.

Rosemarie Bartlett: Thanks Walter. And thanks everybody for your attention today and to Larry and Ben for the great presentation; we really appreciated it. I'm actually going to turn it over to Michael Baechler of PNNL.

Michael Baechler: Okay, thanks Rose. I just want to say that on behalf of DOE and PNNL, we'd like to thank PNC for their participation in the Commercial Buildings Partnership, and also in particular to the

PNC design team for their willingness to analyze, experiment, and innovate throughout this whole design process. So thank you, thank you both for your presentation and your overall participation.

Larry: You're welcome.

Walter: And I know quite a few people had questions about whether or not this presentation will be available. The answer is yes, the recording of this webinar will be sent out to all attendees over the next few days. So be on the lookout for an email from GoTo Webinar, which will have this recording. And with that, that's all we have and again thank you very much to all who attended.